Model Question Paper-1

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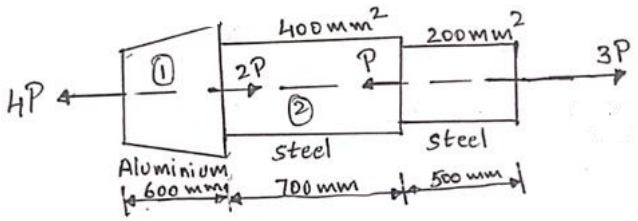
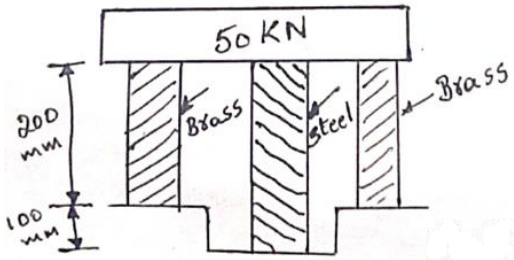
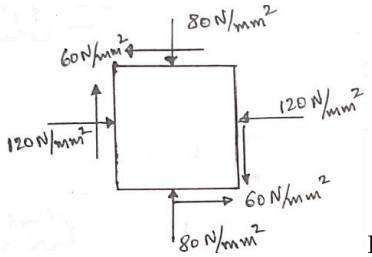
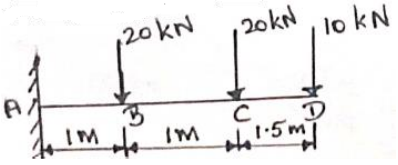
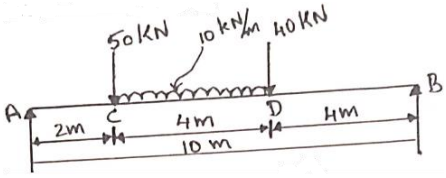
Fourth Semester B.E. Degree Examination

Subject Title: MECHANICS OF MATERIALS

TIME: 03 Hours **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Define the following terms: (i) stress (ii) strain (iv) Young's modulus (iv)Hook's law (v) Poisson's ratio.	L1	10
	b	With neat sketch, explain the stress- strain diagram for mild steel.	L2	10
		OR		
Q.02	a	A round bar with stepped portion is subjected to forces as shown in fig. Q2(a). Determine the magnitude of force P, such that net deformation in the bar does not exceed 1mm. E for steel is 200GPa and that of aluminium is 70GPa. Big end diameter And small end diameter of the tapering bar are 40mm and 12.5mm respectively.  Fig. Q2(a)	L3	10
	b	A steel rod of c/s area 1600mm^2 and two brass rods each of c/s area of 1000mm^2 together support a load of 50KN as shown in fig. Q2(b). Find the stresses in the rod, E for steel is 2*10^5 N/mm^2, E for brass is 1*10^5 N/mm^2.  Fig. Q2(b)	L3	10
		Module-2		
Q. 03	a	The state of stress in a two dimensionally stressed body is shown in fig. Q3. Determine Graphically the principal stresses, principal planes, maximum shear stress and its planes.  Fig. Q3	L3	20

		OR		
Q.04	a	Derive the equations for stresses in thin cylinder.	L1	10
	b	A pipe of 400mm internal diameter and 100mm thickness contains a fluid at a pressure of 80 N/mm^2. Find the maximum and minimum hoop stress across the section. Also sketch the radial pressure distribution and hoop stress distribution across the section.	L3	10
		Module-3		
Q. 05	a	Derive the relation between Load, shear force and bending moment.	L2	10
	b	Draw the shear force and bending moment diagram for the cantilever beam shown in fig. Q5(b).  Fig. Q5(b)	L3	10
		OR		
Q. 06	a	Derive shear force and bending diagram for simply supported beam carrying a point load at mid-point.	L2	10
	b	A simply supported beam of length 10m carries the uniformly distributed load and two point load as shown in fig. Q6(b). Draw SFD and BMD. Also calculate maximum bending moment.  Fig. Q6(b)	L3	10

		Module-4		
Q. 07	a	Derive the relation between bending stress and radius of curvature.	L2	10
	b	A steel plate of width 120mm and of thickness 20mm is bent into a circular arc of radius 10m. Determine the maximum shear induced and the bending moment which will produce the maximum stress. Take E= 2*10^5 N/mm^2.	L3	10
		OR		
Q. 08	a	What are assumptions made in pure bending.	L1	05
	b	Derive expressions for shear stress distribution across a rectangular section.	L2	15
		Module-5		
Q. 09	a	Derive torsional equations.	L2	10
	b	Determine the diameter of a solid steel shaft which will transmit 90Kw at 160rpm. Also determine the length of the shaft if the twist must not exceed 1^0 over the entire length. The maximum shear stress is limited to 60 N/mm^2. Take G=8*10^4 N/mm^2.	L3	10
		OR		
Q. 10	a	Determine Euler's crippling load for a column when both end's hinged.	L2	10
	b	A hollow mild steel tube 6m long 4cm internal diameter and 5mm thick is used as a strut with both ends hinged. Find the crippling load and safe load taking FOS as 3. Take E=2*10^5 N/mm^2.	L3	10